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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/658,861	09/08/2000	Hikaru Yoshitaka	08038.0027	2556

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EXAMINER

NGUYEN, HA T

ART UNIT PAPER NUMBER

2812

DATE MAILED: 01/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/658,861

Applicant(s)

YOSHITAKA

Examiner

Ha T. Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Notice to applicant

1. Applicant's Amendment and Response to the Office Action mailed 05-09-02 has been entered and made of record (Paper No. 16).

Response to Amendment

2. Applicant's arguments with regard to the rejections under 35 U.S.C. 103 have been fully considered, but they are not deemed to be persuasive for at least the following reasons.

Applicant argued that Zhao et al (USPN 6100184, hereinafter "Zhao") in combination with Moore et al. (USPN 6251802, hereinafter "Moore") does not teach the invention of claim 4 because in Moore the etch stop layer 132 does not appear to be used as both an insulating layer and as a mask. The examiner disagrees, note that applicant's arguments are largely directed to what the cited references teach individually. However, it is axiomatic that one cannot show nonobviousness by attacking references individually where the rejection, as here, is based on a combination of references. *In re Young*, 403 F.2d 754, 159 USPQ 725 (CCPA 1968); *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). For example, applicant argues that Moore does not disclose an etch stop layer used as both an insulating layer and as a mask as here claimed. However, Zhao, not Moore, is employed in the rejection to show that feature of the claimed process. Moore is used to show the equivalence of materials used as etch stop layer. In col. 6, lines 61-67, Moore teaches that materials containing silicon oxide, silicon nitride, or silicon, nitrogen, and carbon, or silicon, oxygen, and carbon are equivalent materials for an etch stop layer. Since they are equivalent materials, it would have been obvious for a person of ordinary skill in the art to use a material containing silicon, carbon, and nitrogen instead of silicon oxide or silicon nitride as etch stop in Zhao. Therefore the combined teaching of Zhao and Moore does teach all the limitations of claim 4 and Zhao and Moore in combination with other cited references do make obvious the dependent claims 5-9.

Applicant's arguments about the presence of other layers in Zhao, were found to be irrelevant since the term "comprising" in claim 4 does not preclude additional steps in the process. Besides, in Zhao, layer 15, not 18, is considered to be equivalent to the claimed second insulating layer.

Applicant is referred to the re-statement of the ground of rejection given below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao in view of Moore.

As to claim 4, referring to figs. 1-11 and related text, Zhao discloses a method of fabricating a semiconductor device, said method comprising the steps of : forming a wiring layer 10 on a semiconductor substrate (See col. 4, lines 15-25), the semiconductor substrate having an active region formed thereon (See col. 5, lines 44-49) ; forming a first insulating layer 14 containing carbon on said wiring layer (See col. 6, lines 10-22); forming a second insulating layer 15 on said first insulating layer (see paragraph bridging cols. 5 and 6, and col. 6, lines 23-30); selectively etching said second insulating layer until the surface of said first insulating layer is partially exposed (See fig. 5); selectively etching said first insulating layer with plasma, using said selectively-etched second insulating layer as a mask pattern (See fig. 9 and col. 7, lines 30-54); and forming a new wiring layer on said second insulating layer after selectively etching said first insulating layer (See fig. 11, # 29). But it does not disclose expressly a second insulating layer comprising silicon, carbon and nitrogen. However, the missing limitation is well known in the art because Moore discloses that silicon nitride, silicon oxide, materials containing essentially of silicon, nitrogen and carbon or silicon, oxygen and carbon are equivalent etch resistant materials (See par. bridging cols. 6 and 7).

As to claim 8, Zhao discloses wherein said step of selectively etching said first insulating layer is carried out with the plasma of the gas of an oxygen-containing (see col. 7, lines 36-45).

Therefore, it would have been obvious to combine Zhao with Moore to obtain the invention as specified in claims 4 and 8.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao in view of Moore, as applied to claims 4 and 8 above, and further in view of Fraser et al., U.S. Patent 4244799 (Hereinafter Fraser).

The combined teaching of Zhao and Moore discloses substantially the limitations of claim 5, as shown above. But it does not disclose expressly the addition of boron to the etch resistant second insulating layer. However, Fraser discloses that silicon nitride, silicon oxide, BN are equivalent etch resistant materials (see col. 7, lines 27-40). It would have been obvious for a person of ordinary skill in the art to use two materials having the same function to perform the same.

Therefore, it would have been obvious to combine Zhao and Moore with Fraser to obtain the invention as specified in claim 5.

6. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao in view of Moore, as applied to claims 4 and 8 above, and further in view of Wolf et al.'s "Silicon Processing For The VLSI ERA" (hereinafter "Wolf").

The combined teaching of Zhao and Moore discloses substantially the limitations of claims 6 and 7, as shown above.

But it does not disclose expressly wherein said step of selectively etching said second insulating layer is carried out with the plasma of the gas of a compound containing carbon and fluorine or of the gas of a compound containing carbon and hydrogen .

However, the missing limitations are well known in the art because Wolf discloses that silicon oxide is conventionally etched by using CF₄/ H₂ or CHF₃ (See the table) .

It is within the level of a person of ordinary skill in the art to use conventional material to perform the same function .

Therefore, it would have been obvious to combine Zhao and Moore with Wolf to obtain the invention as specified in claims 6 and 7.

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7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable Zhao in view of Moore, as applied to claims 4 and 8 above, and further in view of Chen.

The combined teaching of Zhao and Moore discloses substantially the limitations of claim 9, as shown above.

But it does not disclose expressly the use of a plasma of a hydrogen-containing gas to selectively etch the first insulating layer.

However, the missing limitation is well known in the art because Chen discloses the use of N_2/O_2 or N_2/H_2 to etch the organic low k dielectric material (See col. 6, lines 51-65).

A person of ordinary skill is motivated to modify Zhao and Moore with Chen because both O_2 and H_2 has the same effect in etching organic low k dielectric material.

Therefore, it would have been obvious to combine Zhao and Moore with Chen to obtain the invention as specified in claim 9 .

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha Nguyen whose telephone number is (703)308-2706 . The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling, can be reached on (703) 308-3325. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Ha Nguyen

Primary Examiner

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